



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,268	02/17/2004	David J. Gulbransen	03W140	2042
7590 05/22/2007				
Raytheon Company EO/E04/N119 2000 East El Segundo Boulevard P.O. Box 902 El Segundo, CA 90245				
		EXAMINER AGGARWAL, YOGESH K		
		ART UNIT PAPER NUMBER		
		2622		
		MAIL DATE DELIVERY MODE		
		05/22/2007 PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/781,268	GULBRANSEN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Yogesh K. Aggarwal	2622	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/17/2004</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

***Claim Objections***

1. Claims 6 and 14 are objected to because of the following informalities: Claims 6 and 10 should be dependent upon claims 2 and 10 respectively. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 4, 5, 9, 12 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al. (US PG-PUB # 2004/0079977).

[Claim 1]

Ying et al. teaches a readout circuit unit cell (figure 4) for use with a radiation detector, comprising

a plurality of capacitances (figure 4, C3 and C5), switches (Paragraph 26 states that it is possible to have more than two legs for the variable capacitive load 202, therefore each leg will have a transistor acting as a switch and a capacitor acting as a load, so e.g. two additional legs will each have a transistor and a capacitor in series and is therefore the transistors are being read as switches) and transistors (M9 and M11) that are programmably (figure 5 shows an intensity detector circuit 205 that generates different conversion gain control signals 203 depending upon the light intensity threshold, Paragraph 22) coupled together to form one of a first amplifier circuit having a first gain state (When the circuit has three legs, the capacitance in the third leg will be added to have pixel conversion gain corresponding to C3+C5+capacitance of third leg) or a second amplifier circuit having a second gain state that differs from the first gain state (e.g. conversion gain for the pixel having a capacitance C3+C5).

Art Unit: 2622

[Claim 4]

Ying teaches where the first gain state overlaps the second gain state (In figure 3, if line 309 is extended, it will overlap 307).

[Claim 5]

Ying teaches where said plurality of capacitances, switches and transistors are programmably coupled together to form said first amplifier circuit below an illumination level threshold, and are programmably coupled together to form said second amplifier circuit above said illumination level threshold (Paragraphs 22, 24-26).

[Claims 9, 12, 13]

These are method claims corresponding to apparatus claims 1, 4 and 5 respectively. Therefore these claims have been analyzed and rejected based upon apparatus claims 1, 4 and 5.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 8, 10, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al. (US PG-PUB # 2004/0079977) in view of Applicant's admitted prior art.

[Claim 2]

Ying teaches a readout circuit that operates as a high gain amplifier and a low gain amplifier circuit but fails to teach where said first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said second amplifier circuit is

Art Unit: 2622

comprised of a Source Follower per Detector (SFD) input circuit. However Applicant's admitted prior art teaches wherein readout circuit amplifier types include a high gain amplifier type known as the charge transimpedance amplifier (CTIA), sometimes referred to as a reset integrator, while a lower gain amplifier type is known as a source follower per detector (SFD, Page 1, Paragraphs 2 and 3). Therefore taking the combined teachings of Ying and Applicant's admitted prior art, it would be obvious to one skilled in the art at the time of the invention to have been motivated to have a first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said second amplifier circuit is comprised of a Source Follower per Detector (SFD) input circuit in order to have a constant bias current while the first amplifier is used as a CTIA and a low noise preamplifier when used as a source follower detector.

[Claim 3]

Ying teaches where the first gain state is wider than the second gain state (figure 3, Paragraph 24. As the capacitances are added the gain reduces, so the first gain state is wider than the second gain state). Applicant's admitted prior art teaches wherein readout circuit amplifier types include a high gain amplifier type known as the charge transimpedance amplifier (CTIA), sometimes referred to as a reset integrator, while a lower gain amplifier type is known as a source follower per detector (SFD, Page 1, Paragraphs 2 and 3).

[Claim 8]

Ying discloses a reset transistor (109) that acts as a reset for the photodiode 105 when the circuit operates in lower or higher gain mode. It is noted that since the reset transistor 109 will inherently have a resistance and due to the voltage supply  $V_{dd}$ , it also acts as a current source.

[Claims 10, 11 and 16]

Art Unit: 2622

These are method claims corresponding to apparatus claims 2, 3 and 8 respectively. Therefore these claims have been analyzed and rejected based upon apparatus claims 2, 3 and 8.

5. Claims 6, 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al. (US PG-PUB # 2004/0079977), Applicant's admitted prior art and further in view of Zhao et al. (US Patent # 6,727,946).

[Claim 6]

Ying in view of Applicant's admitted prior art fails to teach a sample/hold circuit for coupling the unit cell to an output bus, where said sample/hold circuit comprises said SFD input circuit. However Zhao et al. teaches sample and hold capacitor (CS or CR) with a sampling switch (SHS or SHR) and a second source-follower SF2 (col. 1 lines 39-47, figure 1). Therefore taking the combined teachings of Ying, Applicant's admitted prior art and Zhao, it would be obvious to one skilled in the art at the time of the invention to have been motivated to have a sample/hold circuit for coupling the unit cell to an output bus, where said sample/hold circuit comprises said SFD input circuit in order to suppress 1/f noise and fixed pattern noise.

[Claim 14]

This is a method claim corresponding to apparatus claim 6. Therefore it has been analyzed and rejected based upon apparatus claim 6.

[Claim 18]

See Examiner's notes regarding rejection of claim 6.

6. Claims 7, 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al. (US PG-PUB # 2004/0079977), Applicant's admitted prior art and further in view of Janesick (US Patent # 6,909,126).

Art Unit: 2622

[Claim 7]

Ying in view of Applicant's admitted prior art fails to teach where said SFD input circuit operates in one of at least two integration modes: a snapshot integrate-then-read (ITR) mode and a progressive scan integrate-while-read (IWR) mode. However Janesick teaches control circuitry 114 that implements progressive scan (IWR) and snap mode (col. 4 lines 50-64, figure 1).

Therefore taking the combined teachings of Ying, Applicant's admitted prior art and Janesick, it would be obvious to one skilled in the art at the time of the invention to have been motivated to have a snapshot integrate-then-read (ITR) mode and a progressive scan integrate-while-read (IWR) mode in order to have an image undisturbed by noise arising during a sequential readout process.

[Claim 15]

This is a method claim corresponding to apparatus claim 7. Therefore it has been analyzed and rejected based upon apparatus claim 7.

[Claim 19]

See Examiner's notes regarding rejection of claim 7.

7. Claims 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al. (US PG-PUB # 2004/0079977) in view of Applicant's admitted prior art.

[Claim 17]

Ying et al. teaches a readout circuit unit cell (figure 4) for use with a radiation detector, comprising

a plurality of capacitances (figure 4, C3 and C5), switches and transistors (M9 and M11 and also Paragraphs 25 and 26 state that that it is possible to have more legs in the variable capacitive

Art Unit: 2622

load 202 for different light thresholds) that are programmably (figure 5 shows an intensity detector circuit 205 that generates different conversion gain control signals 203 depending upon the light intensity threshold, Paragraph 22) coupled together to form one of a first amplifier circuit having a first gain state (When the circuit has three legs, the capacitance in the third leg will be added to have pixel conversion gain corresponding to  $C3+C5$ +capacitance of third leg) or a second amplifier circuit having a second gain state that differs from the first gain state (e.g. conversion gain for the pixel having a capacitance  $C3+C5$ ). Ying teaches where said plurality of capacitances, switches and transistors are programmably coupled together to form said first amplifier circuit below an illumination level threshold, and are programmably coupled together to form said second amplifier circuit above said illumination level threshold (Paragraphs 22, 24-26).

Ying teaches a readout circuit that operates as a high gain amplifier and a low gain amplifier circuit but fails to teach where said first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said second amplifier circuit is comprised of a Source Follower per Detector (SFD) input circuit and an IR radiation circuit. However Applicant's admitted prior art teaches wherein readout circuit amplifier types include a high gain amplifier type known as the charge transimpedance amplifier (CTIA), sometimes referred to as a reset integrator, while a lower gain amplifier type is known as a source follower per detector (SFD) and an IR radiation circuit (Page 1, Paragraphs 2 and 3). Therefore taking the combined teachings of Ying and Applicant's admitted prior art, it would be obvious to one skilled in the art at the time of the invention to have been motivated to have a first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said



Art Unit: 2622

second amplifier circuit is comprised of a Source Follower per Detector (SFD) input circuit in order to have a constant bias current while the first amplifier is used as a CTIA and a low noise preamplifier when used as a source follower detector

[Claim 20]

Ying discloses a reset transistor (109) that acts as a reset for the photodiode 105 when the circuit operates in lower or higher gain mode. It is noted that since the reset transistor 109 will inherently have a resistance and due to the voltage supply Vdd, it also acts as a current source.

### *Conclusion*


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yogesh K. Aggarwal whose telephone number is (571) 272-7360. The examiner can normally be reached on M-F 9:00AM-5:30PM.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on (571)-272-7304. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit: 2622

YKA

May 13, 2007

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke at the end.

**VIVEK SRIVASTAVA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600**